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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

September 1968 United States Employment Service Technical Report

Development of USES Aptitude Test Battery

for

Fishing-Rod Assembler

(sports equip.) 732.884

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION

Technical Report on Development of USES Aptitude Test Battery

For . . . . .

Fishing-Rod Assembler (sports equip.) 732.884

S-79R

(Developed in Cooperation with the
Wisconsin State Employment Service)

U.S. DEPARTMENT OF LABOR
Willard Wirtz, Secretary

MANPOWER ADMINISTRATION
Stanley H. Ruttenberg,
Administrator

BUREAU OF EMPLOYMENT SECURITY
Robert C, Goodwin, Administrator

U.S. EMPLOYMENT SECURITY
Charles E. Odell,
Director

September 1968

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Charles E. Odell, Director
U.S. Employment Service

DEVELOPMENT OF USES APTITUDE TEST BATTERY

FOR

Fishing-Rod Assembler (sports equip.) 732.884-070

S-79R

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Fishing-Rod Assembler (sports equip.) 732.884-070. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
F - Finger Dexterity	80
M - Manual Dexterity	85

RESEARCH SUMMARY

Sample:

56 (18 male and 38 female) workers employed as Fishing-Rod Assemblers in Wisconsin.

Criterion:

Broad category ratings.

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .65 ($P/2 < .0005$)

Effectiveness of Norms:

Only 75% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-79R norms,

91% would have been good workers. 25% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-79R norms, only 9% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	75%	91%
Poor Workers	25%	9 %

SAMPLE DESCRIPTION

Size:

N = 56

Occupational Status:

Employed workers

Work Setting:

Workers were employed at the St. Croix Corporation, Park Falls, Wisconsin.

Employee Selection Requirements:

Education: None

Previous Experience: None

Age: None

Tests: None

Other: Personal interview and check of references.

Principal Activities:

The job duties of the occupation are shown in the Fact Sheet in the Appendix.

Minimum Experience:

All workers in the sample had at least one month total job experience.

TABLE 2

Means (M), Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion (c^r) for Age, Education and Experience

	M	SD	Range	c^r
Age (years)	33.9	8.5	20-54	-.091
Education (years)	10.2	1.9	6-13	.274*
Experience (months)	5.1	2.2	1-15	.214

*Significant at the .05 level

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002 A, were administered to the sample during May 1955.

CRITERION

The criterion used consisted of pooled broad category ratings made by the personnel manager, plant superintendent and plant foreman. The workers were rated as good, average, or fair. An attempt was made to force the sample into thirds but there was no agreement among the raters with respect to which workers to shift from one category to another. Therefore, it was decided to use the ratings the three raters agreed upon. This resulted in the "good" group having 24 workers, the "average" group having 18 workers, and the "fair" group having 14 workers. These ratings were converted to quantitative values which resulted in criterion scores of 59 for the group of "good workers," 48 for the group of "average workers" and 37 for the group of "fair workers."

Criterion Dichotomy:

The criterion was dichotomized by placing those workers who were rated "Good" or "Average" into the high criterion group and those rated "Fair" into the low criterion group.. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers."

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Tables 3, 4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitude	Rationale
P - Form Perception	Required in detecting flaws and defects in parts to be assembled and in the completed rod, and in selecting proper sized tips, guides and ferrules when assembling rods.
K - Motor Coordination	Required in positioning parts to be mounted and assembled and in winding the guides on the rods.
F - Finger Dexterity	Required in using the fingers to pick up and position in place the tips, guides, ferrules and brads, and in positioning and tying thread while winding.
M - Manual Dexterity	Required in using the hands and arms to handle parts needed in mounting, assembling, finishing and winding.

TABLE 4

Means (M), Standard Deviations (SD), and Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion (c^r) for the Aptitudes of the GATB

Aptitudes	Mean	SD	Range	c^r
G - General Learning Ability	98.1	16.0	58-144	.397**
V - Verbal Aptitude	98.8	14.9	65-131	.389**
N - Numerical Aptitude	94.6	17.5	42-137	.343**
S - Spatial Aptitude	98.6	17.8	65-137	.200
P - Form Perception	97.3	18.8	37-127	.517**
Q - Clerical Perception	101.9	14.1	63-126	.405**
K - Motor Coordination	100.0	17.0	60-136	.485**
F - Finger Dexterity	97.7	17.5	58-129	.581**
M - Manual Dexterity	105.9	20.4	51-146	.584**

**Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X	X	X
Irrelevant									
Relatively High Mean						X	X		X
Relatively Low Standard Dev.		X				X			
Significant Correlation with Criterion	X	X	X		X	X	X	X	X
Aptitudes to be Considered for Trial Norms	G	V	N		P	Q	K	F	M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, P, Q, K, F, and M at trial cutting scores were able to differentiate between the 75% of the sample considered good workers and the 25% of the sample considered poor workers. Trial cutting scores at five point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample; for four-aptitude trial norms, minimum cutting scores of slightly less than one standard deviation below the mean will eliminate about one third of the sample. The Phi Coefficient was used as a basis for comparing trial norms, The optimum differentiation for the occupation of Fishing-Rod Assembler (sports equip.) 732.884-070 was provided by norms of F-80 and M-85. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .65 (statistically significant at the .0005 level).

TABLE 6

Concurrent Validity of Test Norms, F-80 and M-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	2	40	42
Poor Workers	10	4	14
Total	12	44	56

Phi Coefficient (ϕ) = .65 Chi Square (X^2_y) = 23.9

Significance Level = P/2 $<$.0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-32 which is shown in Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .57 is obtained with the OAP-32 norms P-75, F-80, and M-80.

FACT SHEET

Job Title

Fishing-Rod Assembler (sports equip.) 732.884-070

Job Summary

Performs any or all of the tasks in the assembling, winding and finishing of various types of fishing rods, such as jointed bamboo poles and jointed and one piece glass rods.

Work Performed

Dips rod ends in glue or manually brushes glue on end of glass rod. Mounts ferrule on rod end, places in arbor press and pulls handle to force ferrule tightly on glass rod. Crimps upper edge of ferrule by turning it in hand operated crimper. Mounts metal tip on end of rod. Heats tip by holding it over acetylene flame to shrink tip on rod. Mounts and glues reel seats on tubular rods. Places rod in Thermonic Induction Heater to heat, glue and secure reel seat. Brushes glue on butt end of glass rod, pushes cork handle on rod, wipes off excess glue and places in rack to set (dry). On bamboo pole, operates hand fed power drill to drill hole through bamboo to coincide with hole in ferrule. Brushes glue on ends of pole section, mounts ferrule and presses on by pushing against table, shrinks ferrule tightly on rod by heating over acetylene flame. Nails small brad through hole in ferrule for additional security.

Winds guides on rod according to written specifications. Places rod on winding rollers of table. Selects correct size guide and clips guide in place on rod with clothespin. Selects proper color thread and runs thread through tension spring on table. Lays loop of thread on rod for later tying in end. Starts winding thread around rod and guide by turning rod with flat part of one hand and guiding thread with other. When winding is complete, cuts thread with razor blade. Slips loose end of thread through loop and pulls loop to draw end of thread under winding. Trims loose end of thread with razor blade to give neat appearance and prevent unwinding. May use two or three different colors of thread on one winding for appearance.

Finishes glass rods by placing rod in electric powered turning machine on finishing stand. Worker applies color preservative (lacquer and varnish) to windings and rod with brush as rod rotates. Hand brushes underneath guides, removes rod from machine and places in drying rack. (Bamboo rods are precoated with lacquer before coming to assembly department.)

Assembles separate handles for casting rods by dropping collett into open end of handle and positioning in slots to prevent turning. Turns on threaded collar, inserts casting rod and tightens collar to secure rod to handle. Checks tightness of fit by whipping rod.

Visually inspects completed rod for defects in gluing and winding. Pulls rod sections apart to determine if ferrules are secure. Passes good rods on to packer and holds defective rods for repair.

Effectiveness of Norms:

Only 75% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-79R norms, 91% would have been good workers. Twenty-five percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-79R norms, only 9% would have been poor workers.

Applicability of S-79R Norms:

The aptitude test bettery is applicable to jobs which include a majority of duties described above.

GPO 864-981

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